UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 18, 2019

Mr. George A. Lippard, III
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
P.O. Box 88, Mail Code 800
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1 – RELIEF REQUEST (RR-4-16) FOR USE OF ASME CODE CASE N-513-4 AND NRC GENERIC LETTER 90-05 (EPID L-2018-LLR-0100)

Dear Mr. Lippard:

By letter dated July 11, 2018, as supplemented by letter dated July 12, 2018, the South Carolina Electric & Gas Company (SCE&G, the licensee) requested approval from the U.S. Nuclear Regulatory Commission (NRC) for relief from certain requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, IWA-4000 at Virgil C. Summer Nuclear Station (VCSNS), Unit 1. SCE&G requested authorization to use Code Case N-513, Revision 4 (Code Case N-513-4), "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1" for the temporary acceptance of a through-wall leak and NRC Generic Letter 90-05 "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping" for the acceptance of a non-leaking flaw identified in a Class 3 service water branch tee located downstream of the "A" train component cooling water heat exchanger.

The licensee submitted the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(z)(2) on the basis that the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

On July 12, 2018, the NRC staff verbally authorized the use of relief request RR-4-16 until the conclusion of the Unit 1 fall 2018 refueling outage (RF24), or until the temporary acceptance criteria of Code Case N-513-4 are exceeded, or until the leak rate exceeds 50.3 gallons per minute, whichever event occurs first.

The NRC staff has reviewed the proposed alternative and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of alternative request RR-4-16 for VCSNS, Unit 1.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including the third party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Project Manager, Shawn Williams, at 301-415-1009 or by e-mail at Shawn.Williams@nrc.gov.

Sincerely,

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-395

Enclosure:
Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RR-4-16

USE OF ASME CODE CASE N-513-4

USE OF GENERIC LETTER 90-05

RENEWED FACILITY OPERATING LICENSE NO. NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-395

1.0 INTRODUCTION

By letter dated July 11, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18193B109), as supplemented by letter dated July 12, 2018, (ADAMS Accession No. ML18193B111), South Carolina Electric & Gas Company (SCE&G, the licensee), requested approval from the U.S. Nuclear Regulatory Commission (NRC) for relief from certain requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code), Section XI, IWA-4000 at Virgil C. Summer Nuclear Station (VCSNS), Unit 1. SCE&G requested authorization to use Code Case N-513, Revision 4 (Code Case N-513-4), "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1" for the temporary acceptance of a through-wall leak and NRC Generic Letter (GL) 90-05 "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping" (ADAMS Accession No. ML031140590) for the acceptance of a non-leaking flaw identified in a Class 3 service water (SW) branch tee located downstream of the "A" train Component Cooling Water (CCW) Heat Exchanger.

The licensee submitted the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(z)(2) on the basis that the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

On July 12, 2018 (ADAMS Accession No. ML18197A137), the NRC staff verbally authorized the use of relief request RR-4-16 until the conclusion of the Unit 1 Fall 2018 refueling outage (RF24), or until the temporary acceptance criteria of Code Case N-513-4 are exceeded, or until the leak rate exceeds 50.3 gallons per minute (gpm), whichever event occurs first.

2.0 REGULATORY EVALUATION

Paragraph 10 CFR 50.55a(g)(4), *Inservice inspection standards requirement for operating plants*, states, in part:

> Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) that are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI, ... to the extent practical within the limitations of design, geometry, and materials of construction of the components....

Pursuant to 10 CFR 50.55a(z), alternatives to the requirements of paragraphs (b) through (h) of this section may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation. The licensee must demonstrate (1) the proposed alternative would provide an acceptable level of quality and safety; or (2) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

ASME Code Case N-513, Revision 3 (Code Case N-513-3) is approved for generic use in NRC Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 18 (ADAMS Accession No. ML16321A336), with one condition. This RG is incorporated into NRC regulations by reference in 10 CFR 50.55a. Code Case N-513-3 provides criteria, which allows licensees to temporarily accept flaws, including through-wall flaws, in moderate energy Class 2 or 3 piping without performing repair or replacement activities. Code Case N-513-4 contains several revisions including expanding the applicability of the code case beyond straight pipe to include elbows, bent pipe, reducers, expanders, and branch tees. Code Case N-513-4 has not been approved by the NRC for generic use by licensees.

NRC GL 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping" addresses the acceptability of limited degradation in moderate energy piping. The generic letter defines conditions that would be acceptable to utilize temporary non-code repairs with NRC approval.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to authorize the alternative requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Request for Alternative

3.1.1 ASME Code Components Affected

The affected component is an ASME Code Section III, Class 3, Service Water (SW) System 20-inch piping branch tee downstream of the 'A' Component Cooling Water (CCW) Heat Exchanger SW Return Valve (XVB03123A-SW).

3.1.2 Applicable Code Editions and Addenda

The applicable ASME Code, Section XI, Edition and Addenda for the fourth 10-year Inservice Inspection Interval (ISI) at VCSNS, Unit 1, is the 2007 Edition through 2008 Addenda. The fourth ISI interval at VCSNS, Unit 1, began on January 1, 2014, and is scheduled to end on December 31, 2023.

3.1.3 Applicable Code Requirement

ASME Code Section XI, Article IWA-4000 provides requirements for welding, brazing, metal removal, and installation of repair/replacement activities.

3.1.4 Reason for Request

On July 10, 2018, the licensee discovered a pinhole leak (Flaw #1) in the SW system in a branch tee connection down stream of "A" Component Cooling Water (CCW) Heat Exchanger "A" SW Return Valve (XVB03123A-SW). The leakage was estimated to be approximately 0.033 gpm. During ultrasonic inspection (UT) of Flaw #1, the licensee discovered an additional flaw (Flaw #2). The degraded condition is not in compliance with ASME Code, Section XI, Article IWA-4000. The licensee stated that as a result, a number of limiting conditions for operation (LCOs) of the plant technical specifications were not met, including, but not limited to, LCO 3.7.4, "Service Water System". The action statement requires that with only one service water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ASME Code Case N-513-3 is approved by the NRC for generic use and provides criteria to allow temporary acceptance of flaws, including through-wall flaws in moderate energy Class 2 or 3 piping without performing repair or replacement activities in accordance with ASME Code Section XI, Article IWA-4000. However, it does not address the evaluation of flaws in branch tees. The licensee proposes to use Code Case N-513-4, to address Flaw #1, which contains revisions that include the evaluation of flaws, including through-wall flaws, in elbows, bent pipe, reducers and branch tees. Flaw #2 extends partially into the reinforced region of the branch tee. The licensee stated that flaws in the region of branch reinforcement is outside the scope of Code Case N-513-4. To address Flaw #2 the licensee proposes an alternative based on acceptance criteria provided in NRC GL 90-05.

The licensee stated that to repair the flaws in accordance with the ASME Code, Section XI, the plant would have to be shutdown. The licensee further stated that plant shutdown activities would result in additional plant risk that would be inappropriate when a degraded condition is demonstrated to retain adequate margin to complete the component's function. Thus, the licensee contends that compliance with the current code requirements results in a hardship without a compensating increase in the level of quality and safety.

3.1.5 Licensee's Proposed Alternative and Basis for Use

The licensee's proposed alternative is to use ASME Code Case N-513-4, for the evaluation and temporary acceptance of a degraded SW system piping branch tee fitting with a through-wall flaw (Flaw #1). The licensee stated that it will follow all requirements of the code case and will take no exceptions. In addition, the licensee proposed to use GL 90-05 to evaluate Flaw #2. Flaw #2 is below the required minimum wall thickness and extends into the reinforced area of

the branch tee. The licensee imposed a maximum allowable leakage rate of 50.3 gpm, which includes leakage from previously identified leaks in "B" SW train. The licensee stated they will perform a permanent repair/replacement activity at the next scheduled outage, which is fall 2018.

The licensee stated that the limitations in Code Case N-513-3, related to its use on piping components, such as elbows, bent pipe, reducers, expanders, branch tees, and external tubing or piping attached to heat exchangers, have been addressed in Code Case N-513-4. The licensee provided a high level overview of the differences between Code Case N-513-3 and Code Case N-513-4 in its application, listed below:

1. Revised the maximum allowable time of use from no longer than 26 months to the next refueling outage.

2. Added applicability to piping elbows, bent pipe, reducers, expanders, and branch tees where the flaw is located more than $(R_0t)^{1/2}$ from the centerline of the attaching circumferential piping weld (R_0 is the outside pipe radius and "t" is the evaluation wall thickness surrounding the degraded area).

3. Expanded use to external tubing or piping attached to heat exchangers.

4. Revised to limit the use to liquid systems.

5. Revised to clarify treatment of Service Level load combinations.

6. Revised to address treatment of flaws in austenitic pipe flux welds.

7. Revised to require minimum wall thickness acceptance criteria to consider longitudinal stress in addition to hoop stress.

8. Daily walkdown requirement for through-wall leaks changed to provide additional flexibility.

9. Other editorial changes to improve the clarity of the Code Case.

The licensee stated that significant changes in Code Case N-513-4 when compared to NRC approved Code Case N-513-3 are discussed in Reference 6 of its July 11, 2018, application, "Technical Basis for Proposed Fourth Revision to ASME Code Case N-513," from the *Proceedings of the ASME 2014 Pressure Vessels & Piping Conference*, July 20-24, 2014, Anaheim, California.

The licensee performed ultrasonic testing (UT) of the degraded area and used the "Through-Wall Flaws in Branch Tees" approach from Code Case N-513-4 to perform a flaw evaluation of Flaw #1. The results of the flaw evaluation determined that Flaw #1 is acceptable in the configuration evaluated, in accordance with Code Case N-513-4. The flaw evaluation is provided in the licensee's July 11, 2018 application, Attachment 1 of Enclosure 2.

During the UT examination of the area surrounding the through-wall leak (Flaw #1), the licensee discovered a degraded area that is not through-wall but below the Code required minimum wall thickness. The licensee identified this degraded area as Flaw #2. Flaw #2 is partially located within the reinforcement region of the branch tee. The licensee evaluated Flaw #2, as a

through-wall flaw, using the acceptance criteria of NRC Generic Letter 90-05. The licensee used the design pressure to calculate the minimum wall thickness and to perform the GL 90-05 through-wall flaw evaluation. The results of the flaw evaluation determined that Flaw #2 is acceptable in the configuration evaluated using the acceptance criteria in GL 90-05. The flaw evaluation for Flaw #2 is provided in the licensee's July 11, 2018, application, Attachment 5 of Enclosure 2. The licensee stated that using conservative inputs and the conservative through-wall evaluation provides the technical basis for accepting this non-through-wall flaw, which extends into the reinforced region of the branch tee, until the scheduled refueling outage RF-24.

The licensee considered the system flow margin, spray effects and building flooding. The licensee stated that two additional SW leaks (in addition to leaking Flaw #1) were identified during the current fuel cycle in the 'B' SW train and are documented in CR-18-02706 and CR-18-02364. The licensee included these leaks in the system operability evaluation and the plant flooding analysis for the current leak.

The licensee stated there is approximately 800 gpm of flow margin in the SW system. The licensee stated that the current leak is misting on adjacent piping and is not spraying on any safety related equipment that would be adversely impacted by leakage. If the leak develops into a spray, it could impact limit switches on a manual valve that does not require position change for any safety related function. The licensee's calculated design margin for flooding in the Intermediate Building 412' is 271 gpm leakage for the SW system. Application of a safety factor of four to 271 gpm would be 67.75 gpm. The licensee stated for conservativism, the proposed alternative is not valid for total leakage exceeding 50.3 gpm.

3.1.6 Hardship Justification (As stated)

Code repair is considered a hardship without a compensating increase in the level of quality and safety. A Code repair would require a plant shutdown to replace the branch tee. The branch tee is located between valve XVB03123A-SW and the service water pond. The piping cannot be isolated from other portions of the service water system.

Plant shutdown activities result in additional plant risk. Such a shutdown would be inappropriate when an affected ASME Code component in a degraded condition is demonstrated to retain adequate margin to fulfill the component's function. Accordingly, compliance with the current code requirements results in a hardship without a compensating increase in the level of quality and safety.

3.1.7 Duration of Proposed Alternative

The licensee requested use of the proposed alternative until the conclusion of the Unit 1 fall 2018 refueling outage (RF24).

3.2 NRC Staff Evaluation

The NRC staff evaluated the adequacy of the proposed alternative, using Code Case N-513-4 and GL 90-05, in maintaining structural integrity of the branch tee located on the SW piping between valve XVB03123A-SW and the service water pond. The NRC staff also evaluated the hardship or unusual difficulty without a compensating increase in the level of quality and safety if the licensee performed an ASME Code repair in accordance with ASME Code Section XI, IWA-4000.

Code Case N-513-3, provides alternative evaluation criteria for temporary acceptance of flaws, including through-wall flaws, in moderate energy Class 2 and 3 piping. However, Code Case N-513-3 is limited to straight pipe with provisions for flaws that extend for a short distance into the fitting at the pipe to the fitting weld. Evaluation criteria for flaws in elbows, bent pipe, reducers, expanders, branch tees and heat exchanger tubing and piping are not included within the scope of N-513-3. Code Case N-513-4 addresses these aforementioned limitations. Given that Code Case N-513-3 is conditionally approved for use in RG 1.147, Revision 18, the NRC staff focused its review, of the leaking flaw (Flaw #1), on the differences between Code Cases N-513-3 and N-513-4 as they apply to the evaluation of the subject SW branch tee.

The NRC staff also evaluated the licensee's proposed limitation on the leakage rate and its hardship justification.

3.2.1 Temporary Acceptance Period

Code Case N-513-3 specifies a temporary acceptance period of a maximum of 26 months. Code Case N-513-3 is accepted for use in RG 1.147, Revision 18, with the following condition:

> The repair or replacement activity temporarily deferred under the provisions of this Code Case shall be performed during the next scheduled outage.

Code Case N-513-4 includes wording that limits the use of the code case to the next refueling outage and the licensee confirmed in its proposed alternative that it will repair the degraded branch tee at the next refueling outage. Thus, the NRC staff finds that Code Case N-513-4 and the proposed alternative appropriately address the NRC condition on Code Case N-513-3, and, therefore, is acceptable.

3.2.2 Flaw Evaluation Criteria for Elbows, Bent Pipe, Reducers/Expanders and Branch Tees

Evaluation and acceptance criteria have been added to Code Case N-513-4 for flaws in elbows, bent pipe, reducers, expanders and branch tees using a simplified approach, which is based on the Second International Piping Integrity Research Group (IPIRG-2) program reported in NUREG/CR-6444, BMI-2192, "Fracture Behavior of Circumferentially Surface-Cracked Elbows," published December 1996.

The flaw evaluation methodology approach in Code Case N-513-4 for piping components is conducted as if in straight pipe by scaling hoop and axial stresses using ASME piping design code stress indices and stress intensification factors to account for the stress variations caused by the geometric differences. Equations used in the Code Case are consistent with the piping design by rule approach in ASME Code Section III, NC/ND-3600. NUREG/CR-6444 shows that this approach is conservative for calculating stresses used in flaw evaluations in piping elbows and bent pipe. The Code Case also applies this methodology to reducers, expanders and branch tees.

The NRC staff finds that the flaw evaluation and acceptance criteria in Code Case N-513-4 for elbows, bent pipe, reducers, expanders and branch tees is acceptable because the flaw evaluation methods in the code case are consistent with ASME Code Section XI, ASME Code Section III design by rule approach and provides a conservative approach as confirmed by comparing the failure moments predicted using this approach to the measured failure moments

from the elbow tests for through-wall circumferential flaws conducted as part of the IPIRG-2 program.

The NRC staff reviewed the licensee's evaluation of Flaw #1 and verified that it was performed in accordance Code Case N-513-4, Paragraph 3.3, "Through-Wall Flaws in Branch Tees," and, therefore, is acceptable.

3.2.3 Flaw Evaluation in Heat Exchanger Tubing or Piping

Code Case N-513-4 has been revised to include heat exchanger external tubing or piping, provided that the flaw is characterized in accordance with Section 2(a) of the Code Case and leakage is monitored. Section 2(a) requires that the flaw geometry be characterized by volumetric inspection or physical measurement.

The NRC staff finds the proposed alternative does not involve heat exchanger piping or tubing. Therefore, this change is not applicable to the current proposed alternative.

3.2.4 Limit Use to Liquid Systems

Use of Code Case N-513-4 is specifically limited to liquid systems.

The NRC staff finds the proposed alternative is limited to a liquid system and, thus, is consistent with Code Case N-513-4.

3.2.5 Treatment of Service Load Combinations

Modifications in Code Case N-513-4 now make clear that all service load combinations must be considered in flaw evaluations to determine the most limiting condition. Although previously implied in Code Case N-513-3, Code Case N-513-4 makes this requirement clear.

Therefore, the NRC staff finds this change acceptable. In addition, the NRC staff verified that the licensee considered all service load combinations in its evaluation of Flaw #1.

3.2.6 Treatment of Flaws in Austenitic Pipe Flux Welds

The proposed alternative does not involve austenitic pipe flux welds. Therefore, this change is not applicable to the current proposed alternative.

3.2.7 Minimum Wall Thickness Acceptance Criteria to Consider Longitudinal Stress

Although it is unlikely that a minimum wall thickness calculated based on the longitudinal stress would be limiting when compared to a minimum wall thickness calculated based on hoop stress, Code Case N-513-4 includes revisions that require consideration of longitudinal stress in the calculation of minimum wall thickness. Previous versions of the code case only required the use of hoop stress. The NRC staff finds Code Case N-513-4 acceptable because it will ensure that the more limiting of the longitudinal or hoop stress is used to determine minimum wall thickness. In addition, the NRC staff verified that the licensee considered longitudinal stress to determine the minimum wall thickness of Flaw #1.

3.2.8 Leakage Monitoring for Through-Wall Flaws

Code Case N-513-3 required through-wall leakage to be observed via daily walkdowns to confirm the analysis conditions used in the evaluation remain valid. Code Case N-513-4 modifies this requirement by continuing to require that leakage be monitored daily, but now allows other techniques to be used to monitor leakage such as using visual equipment or leakage detection systems to determine if leakage rates are changing. The NRC staff finds this change acceptable because the Code Case continues to require through-wall leaks (i.e., flaw #1) to be monitored daily and the expanded allowable monitoring methods should have no adverse impact. In addition, the licensee stated that it will perform daily walkdowns to quantify the leakage.

3.2.9 Leakage Rate

Code Case N-513-3, Paragraph 1(d) states:

> The provisions of this Case demonstrate the integrity of the item and not the consequences of leakage. It is the responsibility of the Owner to demonstrate system operability considering effects of leakage.

Code Case N-513-4 modified the last sentence, now located in paragraph (f), to state:

> It is the responsibility of the Owner to consider effects of leakage in demonstrating system operability and performing plant flooding analyses.

The maximum allowable leakage rate under the proposed alternative is 50.3 gpm. The leakage rate under the proposed alternative also includes two additional SW leaks that were identified during the current fuel cycle in the 'B' SW train. The proposed maximum leakage rate of 50.3 gpm provides a safety factor greater than 5 when compared to the 271 gpm building flooding margin calculated by the licensee. The staff notes that the leak is downstream of all cooling loads and throttle valves and the SW system has a flow margin of 800 gpm. Therefore, leakage at or below 50.3 gpm would have little or no effect on cooling load flow. The NRC staff finds that the licensee's proposed allowable leakage rate is acceptable because it will provide sufficient time for corrective measures to be taken before significant increases in leakage erodes defense-in-depth, which could lead to adverse consequences.

3.2.10 Evaluation of Flaw #2

Flaw #2, identified by the licensee during UT examination of Flaw #1, partially extends into reinforcement region of the branch tee and is not through-wall. The flaw is 5.85 inches from Flaw #1 and has dimensions of 1.5-in. by 1.25-in. In accordance with Code Case N-513-4 Paragraph 3.5, the evaluation of flaws in the region of branch reinforcement is outside the scope of the case. However, the licensee stated that Flaw #2 can be conservatively bounded by the flaw evaluation performed for Flaw #1 because of their proximity and because Flaw #2 encompasses a smaller area and is surrounded by greater adjacent thickness. In addition, the licensee evaluated Flaw #2 as a through-wall flaw in accordance with NRC GL 90-05. The NRC staff notes that although NRC GL 90-05 is intended to be used on straight pipe, it specifies a linear elastic fracture mechanics (LEFM) approach to disposition flaws. The licensee stated that the pipe stresses used in its calculations were increased to specifically account for stress intensity at the branch tee fitting. The licensee conservatively used a design pressure of 50 pounds per square inch (psi) in lieu of the 16 psi operating pressure of the branch tee to

calculate the minimum required wall thickness. The licensee also used the design pressure of 50 psi in its GL 90-05 flaw evaluation. The GL 90-05 evaluation uses a lower bound fracture toughness of 35 ksi(in)$^{0.5}$ which is conservative for carbon steels. The results of the licensee's evaluation show a stress intensity factor of 27.148 ksi(in)$^{0.5}$ for Flaw #2. GL 90-05 requires that a flaw cannot be greater than 3-in. or 15 percent of total circumference of the pipe. The licensee stated that the flaw is 2.4 percent of the total circumference assuming that the entire circumference has been eroded to the minimum wall thickness of 0.136-in. The NRC staff notes that GL 90-05 limits flaws to less than 15 percent of total circumference. Based on the above, the NRC staff finds that the licensee's evaluation of Flaw #2 acceptable because the licensee evaluation utilized the LEFM method with conservative inputs and therefore provides reasonable assurance of structural integrity for the short duration of time before the Unit 1 fall 2018 refueling outage (RF24).

3.2.11 Hardship Justification

The NRC staff finds that performing a plant shutdown to repair the subject piping branch tee would unnecessarily cycle the unit, resulting in an increase in personnel exposure and plant risk. Therefore, the NRC staff determined that compliance with the specified ASME Code repair requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.3 Summary

The NRC staff concludes that the proposed alternative will provide reasonable assurance of structural integrity of the subject branch tee because: (1) Code Case N-513-4, addresses the NRC condition in RG 1.147, Revision 18, for Code Case N-513-3; (2) flaw evaluations for Flaw #1 and Flaw #2 in the branch tee are based on acceptable methodologies in Code Case N-513-4 and NRC GL 90-05; and (3) the method for determining the allowable leakage rate is adequate to provide early identification of a significant increase in leakage.

The NRC staff concludes that complying with ASME Code, Section XI, requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff determined that the proposed alternative provides reasonable assurance of structural integrity of the subject branch tee, and that complying with ASME Code, Section XI, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2).

Therefore, the NRC staff authorizes the use of the proposed alternative described in the licensee's application until the conclusion of the Unit 1 fall 2018 refueling outage (RF24), or until the temporary acceptance criteria of Code Case N-513-4 are exceeded, or until the leak rate exceeds 50.3 gallons per minute, whichever event occurs first.

All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested and authorized by NRC staff remain applicable, including a third party review by the Authorized Nuclear In-service Inspector.

The NRC staff notes that approval of this alternative does not imply NRC approval of ASME Code Case N-513-4 for generic use.

Principal Contributor: Robert Davis, NRR

Date: January 18, 2019

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